

For #1 -3, find the midpoint of the segment with the given endpoints.

1) C(-5, -17) and D(-8, -2)

2) A(-4, 3) and B(-2, -6)

3) H(-5, 5) & J(7, -4)

$$\frac{-5 + -8}{2}, \frac{-17 + -2}{2}$$

$$\frac{-4 + -2}{2}, \frac{3 + -6}{2}$$

$$\frac{-5 + 7}{2}, \frac{5 + -4}{2}$$

$$\frac{-13}{2}, \frac{-19}{2}$$

$$\frac{-6}{2}, \frac{-3}{2}$$

$$\frac{2}{2}, \frac{1}{2}$$

$$M(-6.5, -9.5)$$

$$M(-3, -1.5)$$

$$M(1, .5)$$

For #4-6, use the given endpoint R and the midpoint M to find the other endpoint S.

4) R(8, 0) and M(4, -5)

5) R(6, 0) and M(0, 2)

6) R(-3, -2) and M(-1, -8)

$$\frac{8 + x_2}{2} = 4 \quad \frac{0 + y_2}{2} = -5$$

$$\frac{6 + x_2}{2} = 0 \quad \frac{0 + y_2}{2} = 2$$

$$\frac{-3 + x_2}{2} = -1 \quad \frac{-2 + y_2}{2} = -8$$

$$8 + x_2 = 8 \quad 0 + y_2 = -10$$

$$6 + x_2 = 0 \quad 0 + y_2 = 4$$

$$-3 + x_2 = -2 \quad -2 + y_2 = -16$$

$$x_2 = 0 \quad y_2 = -10$$

$$x_2 = -6 \quad y_2 = 4$$

$$x_2 = 1 \quad y_2 = -14$$

$$S(0, -10)$$

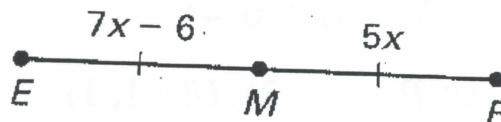
$$S(-6, 4)$$

$$S(1, -14)$$

In each diagram, M is the midpoint of the segment. Find the indicated length.

7) Find XM

8) Find MF



~~XM = 3x~~

$$EM \cong MF$$

$$XM \cong MY$$

$$7x - 6 = 5x$$

$$x + 6 = 3x$$

$$XM = x + 6$$

$$XM = (3) + 6$$

$$XM = 9$$

$$2x - 6 = 0$$

$$MF = 5x$$

$$MF = 5(3)$$

$$MF = 15$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x = 3$$

$$3 = x$$

9) Find MH

10) Find JK



$$\overline{GM} \cong \overline{MH}$$

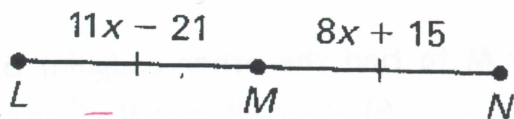
$$4x - 9 = 2x + 5$$

$$\begin{array}{r} 4x - 9 = 2x + 5 \\ -2x \quad -2x \\ \hline 2x - 9 = 5 \\ +9 \quad +9 \\ \hline 2x = 14 \\ \div 2 \quad \div 2 \\ \hline x = 7 \end{array}$$

$$\begin{aligned} MN &= 2x + 5 \\ &= 2(7) + 5 \\ &= 14 + 5 \\ &= 19 \end{aligned}$$

$$\boxed{MH = 19}$$

11) Find LN



$$\overline{LM} \cong \overline{MN}$$

$$11x - 21 = 8x + 15$$

$$\begin{array}{r} 11x - 21 = 8x + 15 \\ -8x \quad -8x \\ \hline 3x - 21 = 15 \\ +21 \quad +21 \\ \hline 3x = 36 \\ \div 3 \quad \div 3 \\ \hline x = 12 \end{array}$$

$$x = 12$$

$$\begin{aligned} LN &= 11x - 21 + 8x + 15 \\ &= 19x - 6 \\ &= 19(12) - 6 \\ &= 228 - 6 \\ &= 222 \end{aligned}$$

$$\boxed{LN = 222}$$



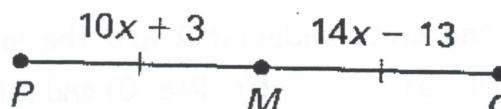
$$\overline{JM} \cong \overline{MK}$$

$$\begin{aligned} JK &= 6x + 11 + 9x - 13 \\ &= 15x - 2 \\ &= 15(8) - 2 \\ &= 118 \end{aligned}$$

$$\begin{array}{r} 6x + 11 = 9x - 13 \\ -6x \quad -6x \\ \hline 11 = 3x - 13 \\ +13 \quad +13 \\ \hline 24 = 3x \\ \div 3 \quad \div 3 \\ \hline 8 = x \end{array}$$

12) Find PQ

$$\boxed{JK = 118}$$



$$\overline{PM} \cong \overline{MQ}$$

$$\begin{array}{r} 10x + 3 = 14x - 13 \\ -10x \quad -10x \\ \hline 3 = 4x - 13 \\ +13 \quad +13 \\ \hline 16 = 4x \\ \div 4 \quad \div 4 \\ \hline 4 = x \end{array}$$

$$PQ = PM + MQ$$

$$\begin{aligned} &= 10x + 3 + 14x - 13 \\ &= 24x - 10 \\ &= 24(4) - 10 \\ &= 96 - 10 \\ &= 86 \end{aligned}$$

$$\boxed{PQ = 86}$$

For #13, the endpoints of two segments are given. Find the length of each segment and determine if the segments are congruent.

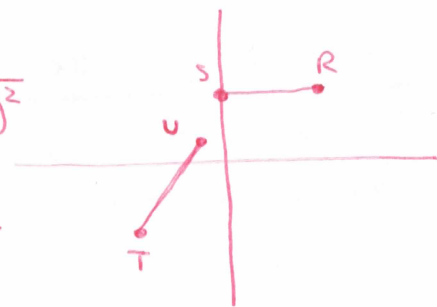
13)

$$\overline{RS}: R(5, 4), S(0, 4)$$

$$\overline{TU}: T(-4, -3), U(-1, 1)$$

$$\begin{aligned} RS &= \sqrt{(0-5)^2 + (4-4)^2} \\ &= \sqrt{(-5)^2 + (0)^2} \\ &= \sqrt{25+0} \\ &= \sqrt{25} \\ RS &= 5 \end{aligned}$$

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ TU &= \sqrt{(-1-(-4))^2 + (1-(-3))^2} \\ &= \sqrt{(3)^2 + (4)^2} \\ &= \sqrt{9+16} \\ &= \sqrt{25} \\ TU &= 5 \end{aligned}$$



THE SEGMENTS ARE CONGRUENT